AQUATIC FUNGI FROM SOUTH BASS AND NEIGHBORING ISLANDS IN WESTERN LAKE ERIE. I. UNIFLAGELLATE AND BIFLAGELLATE PHYCOMYCETES†

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Recently Cooke and Bartsch (1960) pointed out the paucity of publications concerned with the occurrence of aquatic Phycomycetes in Ohio soil and streams. They cite only two other papers (Harvey, 1952; Cooke and Bartsch, 1959) which enumerate this group of Ohio fungi. Each of these papers investigated a possible relationship between polluted streams and the aquatic fungi occurring in them. Cooke and Bartsch (1960) report twenty-one species of biflagellate Phycomycetes and several sterile strains, one of which was an isolate of the genus *Allomyces*, from streams in southern Ohio. As nearly as can be determined from the literature, no attempts have been made to identify the aquatic fungus flora of the islands or waters of western Lake Erie.

The present paper is the first of a series planned to enumerate the species of aquatic and soil-water fungi from the vicinity of South Bass Island. Most of the taxa listed were identified after recovery by the usual "baiting" techniques from soil or water samples, although some were identified directly from their natural substrates. The survey was made during June-July, 1959, at the Franz T. Stone Laboratory, Put-in-Bay, Ohio.

The classification followed is that recommended by Sparrow (1943) in which the Phycomycetes are divided into three series—Uniflagellatae, Biflagellatae, and Aplanatae. The present paper does not treat the Aplanatae and the Chytridiales of the Uniflagellatae.

Results and Discussion

The fungi identified during this investigation are listed in table 1. In Sparrow's treatment (1960) the Blastocladiales is separated into three families, the Coelomomycetaceae, Catenariaceae, and Blastocladiaceae. The latter family includes the genera *Blastocladiella*, *Blastocladiopsis*, *Allomyces*, and *Blastocladia*. [The genera *Sphaerocladia* and *Clavochytridium*, included by Sparrow in this group (1943), are considered synonyms of *Blastocladiella* in his later work (1960)]. Only members of *Blastocladia*, *Blastocladiella* and *Allomyces* were found during our work. The Monoblapharidales, with two families (Monoblepharidaceae and Gonapodyaceae), were represented by a sterile *Monoblepharis* and by *Gonapodya prolifera*.

The biflagellate series contains four orders: Saprolegniales, Leptomitales, Lagenidiales, and Peronosporales. In the Saprolegniales only the type family is represented in these collections, no examples of the other two families being found. Within the Saprolegniaceae there are usually 16 genera recognized, eight, or 50% of which are reported from the test area. The 24 species represent more than 25% of the 80 species of Saprolegniaceae reported in the world in the last 70 years. Among the 24 species of water-molds listed is a new species of *Dictyuchus* the description of which will soon be forthcoming. It is distinct from presently known species in having large numbers of eggs or egg-like structure within the hyphae.

Species of *Achlya* were recovered many times, including the nine species listed in table 1. According to the latest revision of the genus (Johnson, 1956) there are 36 valid species, distributed among three subgenera, *Centroachlya*, *Subcentrica*

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TABLE 1

Aquatic Phycomycetes collected from South Bass and neighboring islands in western Lake Erie, June-July, 1959

Biflagellate
- Saprolegniales
  - *Achlya polyandra*
  - *Achlya dubia*
  - *Achlya americana*
  - *Achlya proliferoides*
  - *Achlya prolifera*
  - *Achlya bisexualis*
  - *Achlya klebsiana*
  - *Achlya flagellata*
  - *Achlya debaryana*
  - *Achlya* sp.
  - *Dictyuchus anomalus*
  - *Dictyuchus monosporus*
  - *Dictyuchus pseudodictyon* and var. with small eggs
  - *Dictyuchus missouriensis*
  - *Dictyuchus* n. sp. (eggs in hyphae)
  - *Geolegnia inflata*
  - *Isoachlya* sp. (?)
  - *Leptolegnia subterranea*
  - *Protoachlya paradoxa*
  - *Saprolegnia monoica*
  - *Saprolegnia parasitica*
  - *Saprolegnia ferax*

Biflagellatae
- Saprolegniales (Cont'd)
  - *Aphanomyces euteiches*
  - *Aphanomyces scaber*
  - *Aphanomyces* sp. (sterile)
- Peronosporales
  - *Pythium aphanidermatum*
  - *Pythium debaryanum*
  - *Pythium ultimum*
  - *Pythium* sp.
  - *Phytophthora undulatum*
- Lagenidiales
  - *Olpidiopsis saprolegniae*
  - *Olpidiopsis varians*
- Leptomitales
  - *Apodachlya brachynema*

Uniflagellatae
- Blastocladiales
  - *Allomyces arbuscula*
  - *Blastocladiella simplex*
  - *Blastocladia ramosa*
  - *Blastocladia globosa*
  - *Blastocladia pringsheimi*
- Monoblepharidales
  - *Gonapodya prolifera*
  - *Monoblepharis* sp. (sterile)

TABLE 2

New records of aquatic Phycomycetes in Ohio

Biflagellatae
- Saprolegniales
  - *Achlya polyandra*
  - *Achlya proliferoides*
  - *Achlya prolifera*
  - *Achlya klebsiana*
  - *Achlya debaryana*
  - *Aphanomyces euteiches*
  - *Aphanomyces scaber*
  - *Dictyuchus anomalus*
  - *Dictyuchus pseudodictyon*
  - *Dictyuchus missouriensis*
  - *Dictyuchus* n. sp.
  - *Leptolegnia subterranea*
  - *Saprolegnia monoica*
  - *Saprolegnia parasitica*
  - *Isoachlya* sp (?)
  - *Protoachlya paradoxa*
- Lagenidiales
  - *Olpidiopsis varians*

Biflagellatae (cont'd)
- Leptomitales
  - *Apodachlya brachynema*
- Peronosporales
  - *Pythium aphanidermatum*
  - *Phytophthora undulatum*

Uniflagellatae
- Blastocladiales
  - *Blastocladiella simplex*
  - *Blastocladia ramosa*
  - *Blastocladia globosa*
  - *Blastocladia pringsheimi*
- Monoblepharidales
  - *Gonapodya prolifera*
  - *Monoblepharis* sp. (sterile)

and *Achlya*. Our nine species, eight of which are from the subgenus *Achlya*, represent 25% of the valid species in the genus.

Each of the species listed for the other orders was identified less frequently than were members of the Saprolegniaceae. In the Leptomitales only *Apodachlya brachynema* was identified. Among the members of the Lagenidiales, which contains both aquatic and non-aquatic species, only the parasites *Olpidiopsis*

saprolegniae and *O. varians* were found. In the Pythiaceae of the Peronosporales, *Phytophthora undulatum* (*Pythiomorpha undulata*), *Pythium debaryanum*, *P. aphanidermatum*, and *P. ultimum* were recovered as well as many unidentified *Pythium* species which were not determined during the survey. [See Blackwell, Waterhouse, and Thompson (1941) who present convincing arguments against maintaining *Pythiomorpha* distinct from *Phytophthora*.]

From table 2 it can be seen that 24 species and two genera of aquatic Phycomycetes are reported for the first time from Ohio soil and water.

Summary

During June-July, 1959, 37 species and one variety of aquatic Phycomycetes were identified from soil or water samples, or from plant or animal material collected on South Bass Island or on neighboring islands in western Lake Erie. The fungi found were members of the uniflagellate and biflagellate series of Phycomycetes. Both parasitic and saprophytic organisms are included among the 24 species and one genus reported for the first time from Ohio.

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